Photoacoustic Monitoring of Water Transport Process in Calcareous Stones Coated with Exopolymers

José Fernando May-Crespo[C]
Física Aplicada, CINVESTAV-IPN, Mérida, Yucatán, México
jfernandomaycrespo@hotmail.com

Benjamin Ortega-Morales
Departamento de Microbiología Ambiental y Biotecnología, Universidad Autónoma de Campeche, San Francisco de Campeche, Campeche, México

Patricia Quintana-Owen and Juan José Alvarado-Gil[S]
Física Aplicada, CINVESTAV-IPN, Mérida, Yucatán, México

Pablo-Genaro Martínez-Torres
Instituto de Física y Matemáticas, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México

Juan C Camacho-Chab
Departamento de Microbiología Ambiental y Biotecnología, Universidad Autónoma de Campeche, San Francisco de Campeche, Campeche, México

Gerardo González-García
Física Aplicada, CINVESTAV-IPN, Mérida, Yucatán, México

Bacterial cells are often found embedded in a matrix of extracellular polymeric substances (EPS) and its growing can occur on inert surfaces in a variety of terrestrial and aquatic environments, including submerged artificial substrata, sediments, soils, and rock surfaces [1,2]. This matrix is a complex mixture of macromolecules, primarily composed of polysaccharides but also containing various amounts of protein, lipid, DNA, and vitamins. EPS are important mainly in terms of attachment, nutrient absorption, and protection against desiccation and antimicrobial agents. Also they can interact actively with dissolved ions in aqueous environments and with framework elements in mineral matrices. EPS have a fundamental role due to their adhesion on the surface of stone, inducing changes in transport process when water penetrates inside of the stones. The photoacuostic (PA) spectroscopy technique has demonstrated to be a tool useful in the study of monitoring of transport of water in real time, which allows obtaining the diffusion coefficient to limestone rocks [3]. In this study, the PA had be used to determinate the influence of different types of EPS in the transport water process when are applied in limestone rocks. The study is complemented by X-ray diffraction (XRD) and scanning electron microscopy (SEM).

References

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